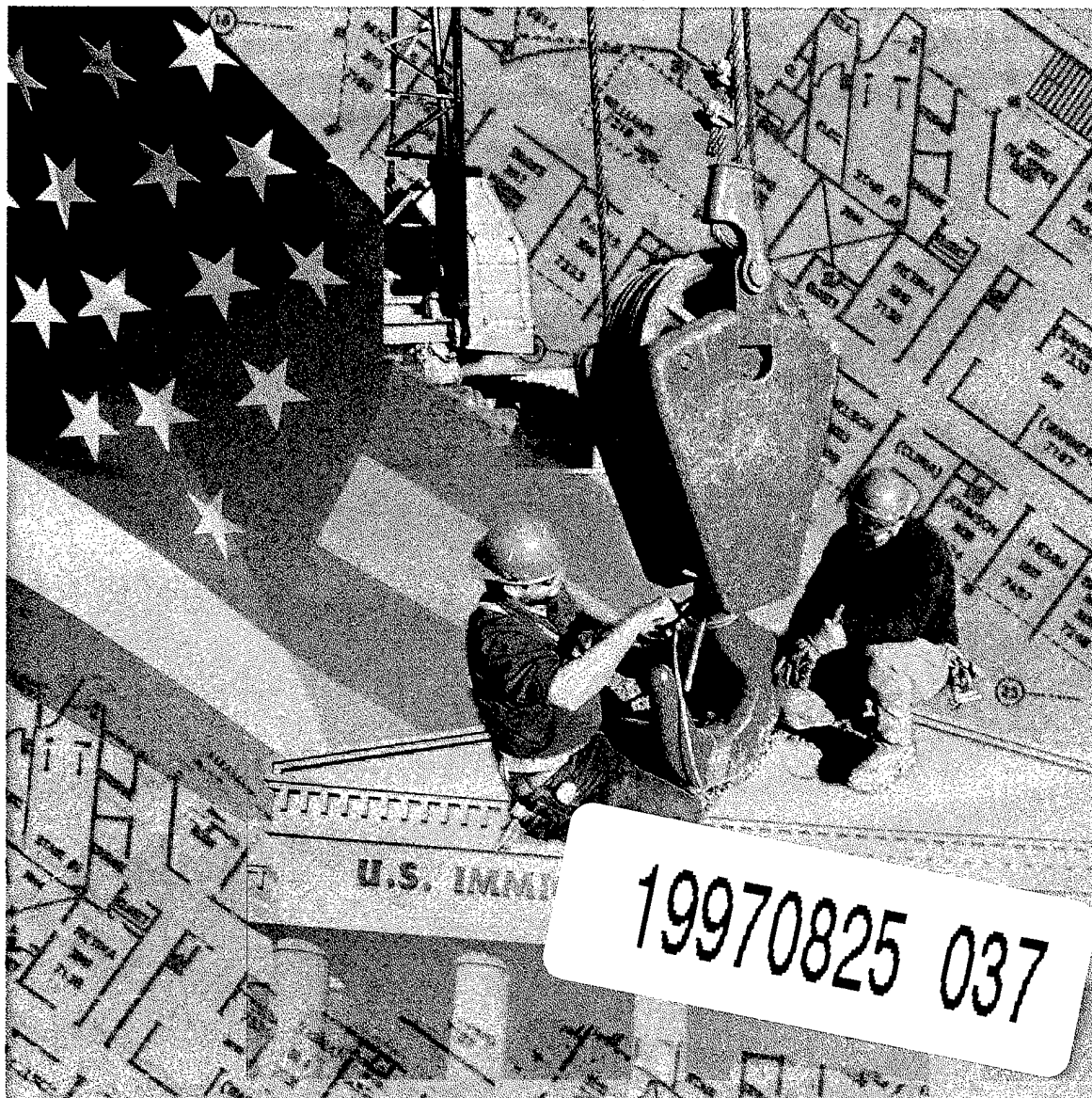


Computer-Aided Facility Management at the U.S. Immigration and Naturalization Service

IN602T2



DISTRIBUTION STATEMENT A

Approved for public release
Performance Unrated

DTIC QUALITY INSPECTED A

LMI

Computer-Aided Facility Management at the U.S. Immigration and Naturalization Service

IN602T2

July 1997

Karen M. Dahut
Paul D. Jung
Mark A. Fritzen
Jeffrey S. Frost

Prepared for the U.S. Immigration and Naturalization Service pursuant to DoD Contract DASW01-95-C-0019. The views expressed here are those of the Logistics Management Institute at the time of issue but not necessarily those of the U.S. Immigration and Naturalization Service. Permission to quote or reproduce any part except for government purposes must be obtained from the Logistics Management Institute.

Logistics Management Institute
2000 Corporate Ridge
McLean, VA 22102-7805

Contents

Chapter 1 Introduction.....	1-1
THE TASK	1-2
STUDY APPROACH	1-3
REPORT ORGANIZATION.....	1-4
Chapter 2 Selection of CAFM Software	2-1
FUNCTIONAL AND OTHER REQUIREMENTS	2-1
SOFTWARE CANDIDATES.....	2-3
SPAN•FM.....	2-7
Chapter 3 Hardware and Other Resources Required for SPAN•FM System.....	3-1
SERVER HARDWARE AND SOFTWARE REQUIREMENTS	3-2
CLIENT HARDWARE AND SOFTWARE REQUIREMENTS	3-3
COMMUNICATIONS NETWORK.....	3-3
SPAN•FM DATABASE	3-4
OTHER REQUIREMENTS	3-5
Ancillary Equipment	3-5
Technical Staffing	3-5
Training.....	3-6
Chapter 4 CAFM System Implementation Plan.....	4-1
TESTING PHASES	4-1
Laboratory Phase.....	4-1
Prototype Phase	4-2
Resource Requirements.....	4-4
Documentation	4-5
DEPLOYMENT PHASE	4-5
Appendix Abbreviations	

FIGURES

Figure 3-1. SPAN•FM System Proposed for INS	3-2
---	-----

TABLES

Table 2-1. Software Candidates for INS's CAFM System	2-4
Table 2-2. Ratings of Candidate CAFM Software, by Criterion	2-7
Table 3-1. Minimum and Recommended Server Requirements.....	3-3
Table 3-2. Minimum and Recommended Client Requirements, by User Type	3-4
Table 4-1. Candidate Participants in the Prototype Phase	4-3

Chapter 1

Introduction

The U.S. Immigration and Naturalization Service (INS), an agency of the Department of Justice, is responsible for enforcing the laws regulating the admission of foreign-born persons (i.e., aliens) to the United States, as well as for administering various immigration benefits, including the naturalization of resident aliens.

Unique to the Service is the dual mission of providing information and service to the general public, while concurrently exercising its enforcement responsibilities to control and guard the borders of the United States against the illegal entry of aliens so that the health, welfare, safety, and security of people of the United States are protected.

INS has four major areas of responsibility: facilitating the entry of legally admissible visitors or immigrants to the United States; granting benefits under the Immigration and Nationality Act, as amended, including providing assistance to those seeking permanent resident status or naturalization; preventing unlawful entry, employment, or receipt of benefits by those who are not entitled to them; and apprehending or removing those aliens who enter or remain illegally in the United States, as well as aliens whose stay is not in the public interest. The Service also has a firm commitment to strengthen criminal investigations and seek the most effective deterrents to illegal immigration.

The operational and management functions of the INS are organized among four executive divisions at headquarters in Washington, DC—Programs, Field Operations, Policy and Planning, and Management. On the operational side, Programs oversees all enforcement and examination functions, and Field Operations provides executive direction to all field offices around the world. On the management side, Policy and Planning is responsible for all activities related to developing and disseminating policy, setting goals and priorities, analyzing and reporting statistics, and other cross-program initiatives. Management oversees all activities that provide technical or administrative support for INS operations.

Because its mission is nationwide, INS also has three regional offices and numerous field offices. The field offices include district offices, with their service processing centers (SPCs) and ports of entry (POEs), and Border Patrol sector headquarters (BPSHs), with their Border Patrol stations (BPSs), highway checkpoints, etc.

In support of its challenging mission, the INS owns and leases, either directly or through the General Services Administration, facilities at more than 400 sites nationwide. The buildings are widely dispersed and may be located in a remote

border area or a city. Furthermore, they range from single, mobile, highway checkpoints to large complexes that host SPCs, BPSs, and POEs. Finally, the buildings have varied uses. For instance, some are commercial office space, while others resemble prisons and police stations.

Managing those facilities, both owned and leased, is a complex undertaking. Not only must INS's facilities management staff keep track of the entire inventory of INS buildings, making sure that they are properly operated and maintained, but it must also plan and oversee each new construction or repair and alteration (R&A) project. Lease negotiations are another important facilities management function.

Historically, INS facilities have been underfunded, particularly in the areas of maintenance and R&A. However, with the renewed focus on immigration-related issues, the INS budget increased 69 percent from FY93 to FY96, and is expected to increase another 41 percent from FY96 to FY98. The increased funding has resulted in increased staffing, which in turn has created requirements for upgraded and new facilities, such as larger Border Patrol stations to house the increased number of Border Patrol agents. Similarly, the influx of people crossing the borders has created requirements for upgraded and new facilities, including new SPCs to house illegal aliens.

Meeting these new requirements will add to the complexity of facilities management at INS, particularly since INS's current information systems do not adequately support the numerous functional requirements in facility management. Inventory and other detailed information for various sites and facilities across the United States is incomplete or even nonexistent, making accurate representation of all INS facilities problematic. Other problems exist as well. For instance, electronic work-order tracking for R&A and new construction projects is nonexistent, hindering effective project management.

To manage its facilities requirements, projects, and resources more effectively and efficiently, INS determined that it needs some type of computer-aided facility management (CAFM) system. Typically, such systems consist of modules for accomplishing functions such as space, project, and lease management; asset and inventory control; and maintenance and work-order management.

THE TASK

Having identified a need for improving its facilities management through the use of information technology, INS asked the Logistics Management Institute to develop a specific strategy for making those improvements. In particular, INS asked that we identify a CAFM system that combines facility management functions into a single, comprehensive system usable at all levels of the organization—headquarters, regional offices, and field offices.

Specifically, INS asked that we

- ◆ identify CAFM software that best meets INS functional requirements,
- ◆ specify the hardware and other resources required for an integrated facility management system using the selected CAFM software, and
- ◆ propose a plan for implementing the new CAFM system.

STUDY APPROACH

We began the task by visiting more than 35 INS facilities, including administrative centers, district offices, SPCs, POEs, BPSHs, and BPSs. Our purpose was to gain an in-depth understanding of what functional requirements should be addressed by the CAFM system. During our site visits, we interviewed more than 100 people ranging in seniority and expertise—journeymen and managers, Border Patrol agents and agents in charge, and facilities managers and maintenance personnel. We also reviewed the documentation for the existing INS information systems and observed various field office personnel while they performed their daily work on other software products. In addition, we reviewed the materials they produce as a routine part of their jobs and the processes they must go through in order to execute tasks. From the information we gathered during our site visits, we developed an initial list of information systems requirements from the perspective of a user, a manager, and a customer.

To refine the list of system requirements, we established a working group comprising representatives from INS headquarters, the regional offices, and the field offices. The group included INS facilities and information technology personnel from around the country, as well as individuals involved in detention and deportation, Border Patrol, inspections, field operations, and engineering. The working group worked with our information technology staff to identify and establish priorities for system requirements.

Our next step was to review industry practices and technological advances in computer-aided facilities management. In particular, we were interested in finding out how other companies with national responsibilities manage their facilities functions and determining the extent to which they use information technology. Our objective was to see how they might apply to INS's requirements.

We then reviewed commercial off-the-shelf (COTS) software to identify the products that might apply to INS. After testing the capabilities of the best candidates, we selected one that we believe meets all of INS facilities needs. Finally, we developed a system implementation plan for the proposed CAFM system.

Throughout the task, we consulted with the INS working group to ensure that we accounted for perspectives at all levels of INS's facilities management organization.

REPORT ORGANIZATION

This report conveys the results of our work. In Chapter 2, we discuss the INS functional and other requirements that the CAFM software must meet, identify some of the candidate products that we assessed, then describe the product we selected. In Chapter 3, we discuss the system elements required to support the selected CAFM software; those elements include hardware, a database, staffing, etc. Finally, in Chapter 4, we propose a plan for implementing the new CAFM system.

Chapter 2

Selection of CAFM Software

Selection of CAFM software that will best meet the needs of the INS facilities management organization requires a clear understanding of what those needs are. This chapter describes the functional requirements that CAFM software must meet, identifies the candidate software products that we analyzed as possible candidates, and then describes the product that the working group selected.

FUNCTIONAL AND OTHER REQUIREMENTS

An effective facilities management system must, at a minimum, enable easy access to information and must streamline routine tasks. In particular, senior INS management must have direct access to information at any time, whether a standard report or a custom report, and without having to send data calls to the field offices. With direct access to information, senior managers will have current knowledge of production, costs, and trends, enabling them to plan and manage the facilities program. In addition to having easy access to the information, managers also should be able to easily print the information in an attractive format using a variety of graphics (bar charts, pie charts, curves, etc.) and tables.

The facilities information system must enable the staff to perform routine tasks efficiently and effectively. Task performance should be enhanced by the information system rather than impeded by it. That is, the system must support the users rather than vice versa. For example, if it takes longer to complete a task using an information system than it would if done by hand, then the system must be considered a liability and streamlined to increase personnel productivity. The system also must be considered a liability if the staff must spend inordinate amounts of time entering or retrieving data. Rather than being a burden, the information system should be designed to free personnel to perform other aspects of their jobs—such as interacting with various vendors, architects, and construction/leasing personnel—in a timely manner.

The primary tasks performed by the INS facilities management organization can be grouped into three categories: management of new construction and repair and alteration projects, tracking of the facilities inventory (both owned and leased assets), and maintenance management. To support project management tasks, the facilities management system should enable INS to track a project from inception through occupancy, including budgeting, funding, leasing/site acquisition, design, and construction. Moreover, INS must be able to use the system for any type of project as well as any type of delivery method, including design-build or design-bid-build.

Among other specific project management functions, the system should

- ◆ track funds and project payments, including the original budget, amount approved, and amount spent;
- ◆ track project schedules and milestones;
- ◆ allow the inclusion of comments;
- ◆ have a robust on-line reporting capability; and
- ◆ have long-term planning capabilities that link to 5-year plans.

For facility managers, the system must provide enough detailed information about the building inventory to ensure effective management of both owned and leased assets. Required information includes

- ◆ basic facility description (address, congressional district, latitude, longitude, etc.);
- ◆ breakdown of building area and usage based on space classification;
- ◆ occupancy data;
- ◆ building classification;
- ◆ building owner;
- ◆ basic financial data (acquisition cost, capitalized cost, capitalized improvements, lifetime maintenance costs, replacement value);
- ◆ tenants;
- ◆ photographs;
- ◆ annual operating costs; and
- ◆ for leased facilities, data on options, lease expiration dates, lease requirements, lessor information, maintenance requirements, expansion/space availability, annual rent, etc.

To support maintenance management tasks, the facilities management system should, among other things,

- ◆ produce preventive maintenance schedules and generate preventive maintenance work orders automatically;
- ◆ maintain records of maintenance performed;

- ◆ make work assignments with specified people, equipment, and materials;
- ◆ schedule and track work;
- ◆ identify and track materials inventory and costs;
- ◆ maintain vendor and contractor lists; and
- ◆ store, access, and view computer-aided design and drafting (CADD) files or images on line.

In addition to being a single, comprehensive system for managing facilities-related tasks, the CAFM system must provide on-line reporting capabilities with an acceptable response time. The reports may be standard (annual, monthly, daily) or custom.

The system also should be capable of producing the following products:

- ◆ Property profiles
- ◆ Plans (facility)
- ◆ Forms
- ◆ Graphics
- ◆ Maps
- ◆ Data extracts (to other systems).

Finally, the software must operate on the Microsoft Windows platform.

SOFTWARE CANDIDATES

More than 50 CAFM products are on the market. Their capabilities, which vary substantially, may include any combination of project or facility management, computer-aided design (CAD), space planning, accounting, and other features.¹ Table 2-1 lists the products that we identified as being the most promising candidates for meeting INS's functional requirements. The table also shows the specific functions that each product can perform.

¹ We also looked at two graphical information systems (GISs) to assess their compatibility with CAFM systems. Those systems were MapObjects, developed by Environmental Systems Research Institute, and MapInfo, developed by MapInfo.

Table 2-1. Software Candidates for INS's CAFM System

Product/vendor	Project mgmnt	Facility mgmnt	Maint. mgmnt	Property mgmnt	CAD or CADD	Space planning	Asset mgmnt
Aperture/Aperture Technologies	X	X		X	X	X	X
AutoCAD/AUTODESK					X		
MaintStar/Bender Engineering	X	X	X		X		X
Drawbase/CADworks, Inc.	X	X		X	X	X	X
CAMS/CMS	X	X	X		X		X
Express/DataOne		X			X	X	X
MP2/Datastream	X		X				X
FM:Systems/FM:Systems		X		X	X	X	X
TMS/Four Rivers Software Systems			X				X
SPAN•FM/Innovative Tech Systems, Inc.	X	X	X	X	X	X	X
Archibus/MicroDec		X	X	X	X	X	X
AMMS/MicroWest Software Systems	X	X	X				X
Service Call Express/Omnicom		X	X		X		X
Maximo Advantage/PSDI		X	X		X		X
Maximo Enterprise/PSDI	X	X	X		X		X

Notes: AMMS = Advanced Maintenance Management System; CAMS = Computer Assisted Management Systems; CMS = Creative Management Systems; PSDI = Project Software and Development, Inc.; and TMS = Total Maintenance System.

We narrowed the list of candidates to five based on their ability to meet INS functional requirements. Four of the candidates (Archibus, FM:Systems, Maximo Enterprise, and SPAN•FM) are considered true CAFM systems, and one (Aperture) is a front-end program. At the request of INS, we added a sixth candidate to the list—a front-end program developed by General Analytics Corporation (GAC).

To aid the selection process, the vendors of five of the candidates demonstrated their products to the INS working group. The following are brief descriptions of the systems as presented:

◆ Aperture

- Aperture is not a true CAFM system. It is a front-end type system that works well with standard computerized maintenance management systems such as Maximo.
- It is not dependent on outside CAD or database files but can import these types of data.
- It is highly graphical.

◆ Archibus

- The front end of this system can be through CAD, Windows, or a geographic menu system (not a true GIS product).
- It is CAD intensive and CAD dependent. (The salesman said that Archibus may not be the way to go if INS does not have a lot of CAD drawings.)
- Lease and telecommunications modules are new releases.
- Pricing varies with the number of seats. Modules are typically \$2,000 per seat. Site licenses are available.
- Two days of training per module is recommended.

◆ FM:Systems

- The company has been in existence since 1996.
- It is currently adding three new modules: move management, service requests, and project management.
- It is working on an intranet feature.
- The company does not have any resellers. Support is handled directly through the company.
- FM:Systems costs \$7,000 per seat; the three new add-on modules are \$3,000 each.

◆ GAC

- The GAC product is a system based on GIS (MapInfo) but is not considered to be a CAFM system in the traditional sense.
- It can manage hundreds of layers.
- It is based on the drill-down concept in which a user can start with a map of the United States and zoom in on any particular location of interest.
- It is based on Windows.
- CADD drawings can be brought into the system.
- It is more an executive information system than a system for the end user.

-
- Costs range from \$100 to \$900 per seat depending on the requirements and needed capabilities.
 - Much of the cost related to this type of system is in improving the quality of the existing data.
 - ◆ SPAN•FM
 - It is compatible with both AutoCAD and MicroStation.
 - It enables budgeting for projects in future years.
 - It has 250 standard reports with a report writer function that will let the user customize reports (the Microsoft Access report writer function can also be used).
 - It is a very robust system with a lot of detail for the user.
 - The user can launch Microsoft Project from the system or input Project schedules into the system.
 - Typically, a complete package with all modules except CAD and Cable would cost \$5,000 per concurrent seat. (CAD is \$3,500 and Cable is \$4,500 additional per seat.) In addition, support is about 15 percent of the software cost, and training is \$50 per hour per person.

We reviewed the Maximo Enterprise package independently.

In general, it was difficult to determine which of INS's requirements each system meets because of different terminology and system structuring. For instance, the terms "asset," "lease," and "property management" are used almost interchangeably. Moreover, we considered it important to choose a system that would meet not only current requirements, but also, to the extent possible, likely future requirements: "CAFM is not a product but a way of life." Another important consideration is whether the system will be easily updatable; the working group recognized that any CAFM system is likely to be outdated in 3 years because the CAFM software industry, along with organizations' requirements, is changing rapidly.

To help focus the demonstrations and standardize the comparisons, working group members filled out a rating form for each product. However, it was agreed that LMI should recommend the final product because of the difficulty of establishing meaningful ratings based on a single demonstration. We concluded that the GAC system could not meet INS requirements, so we eliminated it from further consideration. We then reviewed the remaining products further, considering such criteria as market presence, maturity, ease of use, and developer support. The additional criteria are important because, not only does the software need to fulfill the requirements, it must also be user friendly and well supported by the

developer. We also considered the staffing and training that would be required to support the software implementation at INS. Table 2-2 lists the five final candidates and shows our ratings.

Table 2-2. Ratings of Candidate CAFM Software, by Criterion

Software	Criterion				
	Capabilities	Market presence	Maturity	Ease of use	Developer support
Aperture	2	3	2	4	4
Archibus	3	5	4	2	4
FM:Systems	4	3	3	4	4
Maximo Enterprise	4	4	5	1	4
SPAN•FM	5	4	3	4	4

Note: 0 = poor, 1 = fair, 3 = good, 4 = very good, and 5 = excellent.

Based on our analysis, we concluded that SPAN•FM, developed by Innovative Tech Systems, Inc., is the CAFM software best suited to meet INS needs. While not as mature as the other candidates, SPAN•FM meets all of the capabilities required by INS, is easy to use, and has very good market presence and developer support. Furthermore, Innovative Tech showed that SPAN•FM will run successfully with Windows 3.1, Windows for Workgroups, and Windows 95.

SPAN•FM

SPAN•FM is a commercial off-the-shelf, client-server application that will run on most computers currently owned by INS. Specifically, it will run on all of the computers that are equipped with Intel-based 486 or greater processors and are driven by either Microsoft Windows 3.1 or greater.

SPAN•FM consists of 10 separate functional modules that operate with each other seamlessly. Those modules, and their capabilities, are as follows:

- ◆ *Space Analysis.* Creates flexible space-usage models with user-defined criteria. Produces a complete space-programming document. Tracks personnel, offices, workstations, and support space. Manages current and future space requirements. Creates “what-if” scenarios. Produces management reports.
- ◆ *Asset Management.* Manages any item as a unique asset. Tracks unlimited features and options per asset. Tracks (by location or department) investments in furniture, fixtures, and equipment; supplies; and labor. Manages

moves to new locations and generates asset audit trails. Tracks asset warranties and service agreements. Implements a full bar code asset system.

- ◆ *Materials Handling.* Manages and maintains a complete spare parts inventory. Creates requisitions, purchase orders, change orders, and inventory transfers. Manages purchase contracts, blanket purchase orders, inventory reserves, and storeroom audits. Manages and maintains the organization's materials requirements effectively with an on-line purchase order query system. Manages multiple storage locations with corresponding minimum and maximum stocking quantities. Manages shipping and receiving functions.
- ◆ *Lease Management.* Monitors property leases, costs, values, and taxes. Tracks gross, rentable, and usable areas. Calculates monthly and annual lease costs. Reviews lease's representatives, services, and clauses. Tracks critical dates for expirations, options, and escalations. Manages internal lease charge-backs.
- ◆ *Maintenance Management.* Creates work orders to track material and labor costs. Performs and manages both proactive and reactive maintenance tasks. Tracks hazardous waste materials. Conducts failure analysis. Establishes preventive maintenance projects and budgets. Manages equipment and building histories.
- ◆ *WinStack.* Produces as-is stack diagrams. Assigns affinity and adjacency relationships. Produces projection stack diagrams based on spatial forecasts. Produces dynamic stack graphics and reports.
- ◆ *Project Budgeting.* Facilitates the project budgeting process. Tracks actual versus projected budgets. Monitors total dollars budgeted. Tracks critical milestone dates. Categorizes budgets and expenses. Generates project work orders. Tracks vendor invoicing and payments. Tracks commitments. Monitors invoices and payments. Directs interface to Microsoft Project for additional graphical analysis.
- ◆ *Infomaker.* Provides standardized and customized reporting capabilities both within the SPAN•FM operating environment or as a stand-alone reporting tool. Has access to all data in the system.
- ◆ *CAD Integrator.* Provides bi-directional interface between CAD software and the SPAN•FM software. Supports both AutoCAD and MicroStation CAD systems. Follows Building Owners and Managers Association standards for space charge-backs. Calculates and tracks square footage by organizational hierarchy. Provides cost estimates, takeoffs, and analyses. Tracks assets. Tracks telecommunications and data requirements. Performs ad hoc graphical queries on the database to obtain the latest

information available in a graphical format. Views the database information and generates instant reports without affecting the drawing. Creates what-if scenarios on floor plan models without affecting original drawings or the database.

- ◆ *Cable Management.* Obtains information about every aspect of the telecommunications, voice, and multinet network environments. Visually displays connectivity between components and flow paths of the cable. Tracks cable routes, types, characteristics, cross-connect locations, addresses on a cable run, devices, terminals, and sockets. Assigns next available cable/channel to an open work order and provides on-line totals or channel status. Tracks trouble tickets from inception to resolution.

SPAN•FM is licensed by concurrent-user seats. A concurrent-user licensing system allows the software to be loaded on as many individual computers as required, but limits the number of people who can access the system at the same time.

The standard SPAN•FM seat includes the first eight modules: Space Analysis, Asset Management, Materials Handling, Lease Management, Maintenance Management, WinStack, Project Budgeting, and Infomaker. The standard seat will be sufficient for most individuals who use the software daily. The cost of a standard seat is approximately \$5,000. However, Innovative Tech typically offers discounts as follows:

3–4 seats	10% off
5–10 seats	15% off
11–20 seats	20% off
20–30 seats	25% off

In addition to having the standard module, some individuals—those involved in facility design—will need the CAD Integrator module (as well as AutoCAD drafting software). Others—those involved in computer network issues—will need the Cable Management module. The CAD Integrator module will cost an additional \$3,500 per concurrent seat, and the Cable Management module will cost an additional \$4,500 per seat.

For people who need only occasional access to the database—to generate reports, for example—INS has the option of purchasing the Infomaker module only. INS will not need to purchase licenses for Infomaker users. INS also could access the database using other open database connectivity compliant software, such as Microsoft Access.

Innovative Tech will customize SPAN•FM for INS if necessary, and it will train INS staff.

Chapter 3

Hardware and Other Resources Required for SPAN•FM System

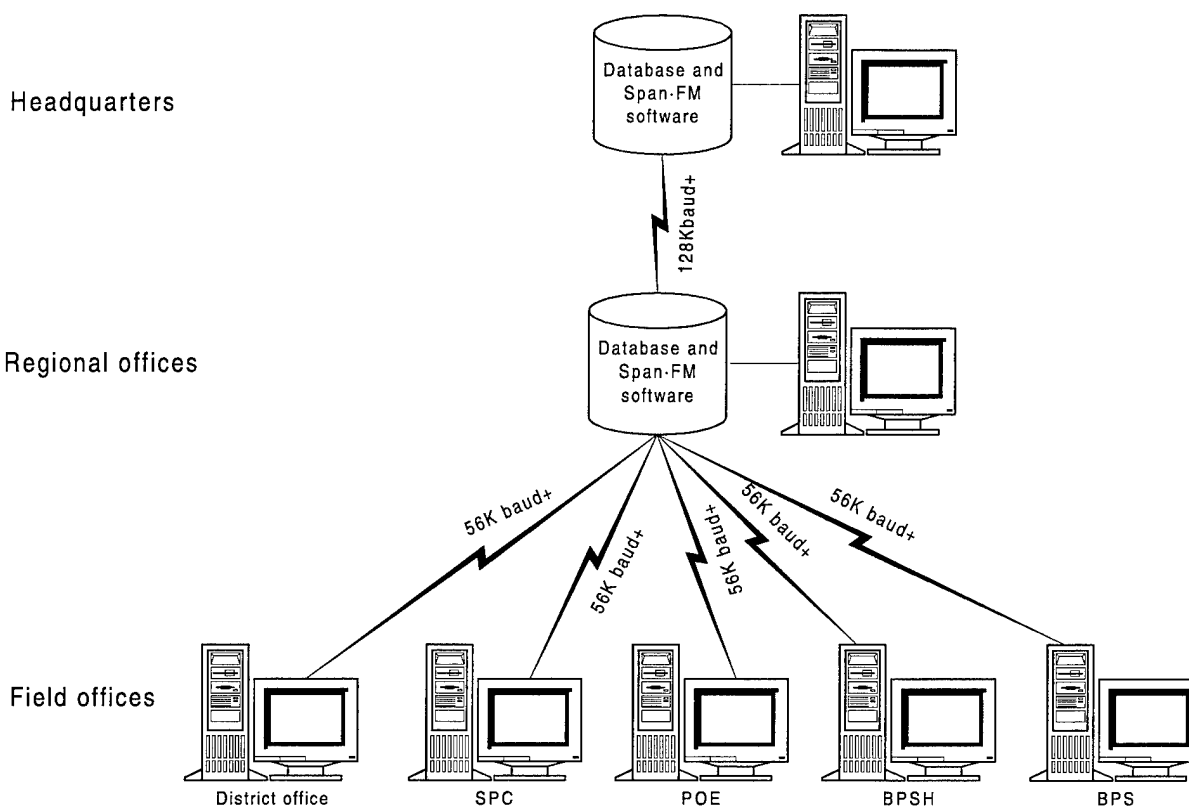
The selection of CAFM software is only the starting point when developing an integrated facilities management system. Among other elements that constitute a complete CAFM system are the hardware required to run the software, the database, and the people who operate the system. In some cases, the elements vary depending on the user, organizational level, or both.

The specific elements required for a facilities management system based on SPAN•FM are determined in part by the fact that SPAN•FM is a client-server application. Such applications place the software and the data on separate machines that must then be linked via a communications network.

As envisioned for INS, the SPAN•FM system will have the main database on a server located at INS headquarters. The database will be replicated on servers at each regional office. To query the database, the clients, or users, will need appropriate connectivity software in addition to the CAFM software. Some users also will need CADD software.

Figure 3-1 depicts the SPAN•FM system proposed for INS. Each system element is discussed in more detail in the remainder of this chapter. In addition, we describe some ancillary equipment that will enhance INS's SPAN•FM system and discuss staffing and training required to operate the system.

Figure 3-1. SPAN•FM System Proposed for INS



SERVER HARDWARE AND SOFTWARE REQUIREMENTS

For the database software on the server, we recommend Oracle7. Oracle7 provides efficient, reliable, secure data management for applications ranging from high-volume on-line transaction systems to query-intensive data warehouse applications. Oracle7 not only supports the complex data management needs of businesses today, but it also provides the tools to manage the systems, flexibility to distribute the data to users effectively and efficiently, and scalability to achieve optimal performance from all available computing resources.

Table 3-1 lists the minimum hardware and software required for the SPAN•FM system server; it also shows the recommended hardware and software that will ensure optimal performance of the SPAN•FM system.

Table 3-1. Minimum and Recommended Server Requirements

Requirement	Minimum	Recommended
Hardware		
Server	586/100	586/200+
Memory	32 MB RAM	64 MB RAM
Storage	4 GB	8 GB
Monitor	VGA 640x480	SVGA 1024x768
Mouse/keyboard	Standard	Standard
Ethernet card	Connection to LAN	Connection to LAN/Internet
Tape drive	Not required	6 GB DAT backup
Peripherals	Not required	CD-ROM 4X or better
Software		
Operating system	Windows NT	Windows NT
Database connectivity	Oracle server software	Oracle server software
CAFM	SPAN•FM	SPAN•FM
CADD	Not applicable	Not applicable

Note: LAN = local area network.

CLIENT HARDWARE AND SOFTWARE REQUIREMENTS

Table 3-2 shows the minimum hardware and software required for clients (users) to operate SPAN•FM, as well as the recommended hardware and software to ensure optimum performance. The requirements are provided both for users who need daily access to the SPAN•FM modules and for occasional users—those who need access to the system (via the Infomaker module) only to generate standardized reports. The user interface will be clear and comprehensive; it will be GIS compatible and will be capable of storing pictures and drawings of INS sites and facilities.

COMMUNICATIONS NETWORK

For the SPAN•FM system to operate, INS must have a communications infrastructure linking the application users at both headquarters and the field offices to the database, at a minimum data throughput of 56K baud. INS has already installed a wide area network and is connecting selected sites and outfitting them with new hardware and software. It will communicate using a wide area network protocol. Sites that do not yet meet the minimal communications speed of 56K baud will need to implement a temporary connection to the regional office. This temporary connection could be created using ISDN or similar technology. Regardless of the type of connection used, the TCP/IP communications protocol will allow the SPAN•FM system to operate as intended.

Table 3-2. Minimum and Recommended Client Requirements, by User Type

Requirement	Daily users		Occasional users	
	Minimum	Recommended	Minimum	Recommended
Hardware				
PC/workstation	486/33	586/100	486/33	486/33 or greater
Memory	16 MB RAM	24 MB RAM	16 MB RAM	16 MB RAM
Storage	500 MB/70 MB free	1GB/200 MB free	500 MB/70 MB free	500 MB/70 MB free
Monitor	VGA 640x480	SVGA 1024x768	VGA 640x480	VGA 640x480
Mouse/keyboard	Standard	Standard	Standard	Standard
Ethernet card	Connection to LAN	Connection to LAN/Internet	Connection to LAN	Connection to LAN/Internet
Software				
Operating system	Windows 3.1	Windows 95	Windows 3.1	Windows 95
Database connectivity	Oracle client software	Oracle client software	Oracle client software	Oracle client software
CAFM	SPAN•FM—8 modules	SPAN•FM—all modules	SPAN•FM—Infomaker module	SPAN•FM—Infomaker module
CADD	Not required	AutoCAD	Not required	Not required

SPAN•FM DATABASE

The main SPAN•FM database will be located at INS headquarters in Washington, DC, and replicated at each of INS's three regional offices. Every night, the servers at headquarters and the regional offices will synchronize and update data that have changed on one or the other machines during the day.

The main database will be populated with data from six sources. Those sources and the frequency and type of data transfer are as follows:

- ◆ Comprehensive Facility Condition Audit. Contains detailed data on all INS facilities with special emphasis on maintenance and repairs.
- ◆ Asset Management Information System (AMIS). Contains data on INS real property assets. Once a week, bi-directional.
- ◆ Foundation for Information Real Property Management (FIRM). Contains General Services Administration leasing information. Once a month, import only.

- ◆ Facilities Renovation and New Construction System (FRANCS).¹ One-time data import.
- ◆ The Environmental Company (TEC). Contains detailed site-survey data, among other data, from many different sources. One-time data import.
- ◆ Interim Project Tracking System. Contains site, facility, and some financial data.² One-time data import.

Innovative Tech plans to work with Electronic Data Systems Corporation to create the required bridge software.

OTHER REQUIREMENTS

Ancillary Equipment

In addition to obtaining the client hardware and software required to operate the SPAN•FM system, INS should purchase the following equipment for use at headquarters and the regional offices:

- ◆ A flatbed scanner, which will allow users to input pictures and drawings of facilities.
- ◆ A color printer, which will aid in representing data, images, reports, and trends.
- ◆ A tape drive or equivalent backup device, which will save and archive data in the SPAN•FM system.

Finally, for users of the CAFM CAD Integrator module (which requires AutoCAD), INS should purchase digitizers and plotters.

Technical Staffing

The additional technical support staff required to operate the SPAN•FM system is minimal. Headquarters will need a database manager, and each regional office will need a database administrator (DBA). The database manager and the DBAs should be proficient in Oracle and Powerbuilder software, and should have some network administration experience.

The general responsibilities of the database manager at headquarters will be to maintain the main SPAN•FM system database and to coordinate data updates and

¹ FRANCS is no longer used; the data will have to be examined to determine validity.

² This system was set up as a temporary database to aid INS with project tracking until a CAFM system could be implemented.

transfers to the regional databases. Because INS headquarters already has some experience with an Oracle database, it should be able to support the new Oracle database with existing in-house personnel.

The primary duties of the DBAs will be to maintain their respective regional CAFM databases, administer the SPAN•FM and Oracle software, and add new functionality and reports to the CAFM system as appropriate. If the regional office already employs an individual with the necessary qualifications, that person could be trained as the SPAN•FM DBA. Otherwise, INS could hire a contractor until it can fill the position with an INS employee.

The staffing required to support the facility management programs and CAFM system will be analyzed during the implementation phase.

Training

INS should use a two-tiered training approach. Innovative Tech will train the database manager at headquarters and the regional DBAs, as well as the high-end users of SPAN•FM. The database manager and the DBAs will require 5 days of training to learn all aspects of the software and to prepare them for a support role as spot trainers for other INS personnel. Daily users will require 2 to 3 days of training, while occasional users will get 1 day of training.

Chapter 4

CAFM System Implementation Plan

The proposed CAFM system will provide INS's facility management organization a whole new way of conducting business. Not only will the system automate and integrate most tasks involved in facilities management, but it will require changes in the organization's business processes.

To ensure that the system is as problem free as possible, as well as to reduce the amount of disruption that naturally occurs whenever a new system is introduced, INS should implement the CAFM system in phases: two testing phases (laboratory and prototype) and a deployment phase. A phased implementation approach will give INS a chance to isolate and rectify any operational difficulties with the CAFM system, as well as to customize aspects of the system as appropriate, before installing the system INS-wide.

This chapter describes the testing phases and discusses the software, data, staffing, and training required to complete those phases. It then discusses some of the decisions that INS must make as part of the deployment phase.

TESTING PHASES

The testing phases should include the following:

- ◆ Laboratory phase, in which the software is tested in a controlled environment
- ◆ Prototype phase, in which the software and its supporting hardware and interfaces are tested in selected headquarters, regional, and field offices.

Laboratory Phase

PURPOSE

The purpose of the laboratory phase is to conduct a rigorous "stress" test of CAFM's capabilities in a controlled environment using testers who are familiar with the technology or facilities management, or both. The goal is to conduct the laboratory phase in an environment that is free of all external factors, such as changes in business processes, that can cause problems when a new software system is being implemented.

The laboratory phase will be the first opportunity to test the CAFM system using INS data and will involve testing the supporting hardware and software to make sure that they work together as intended and to solve any system or functional problems that may arise. In addition, the laboratory phase will provide the opportunity to work with Innovative Tech to customize reports and data screens and to determine data storage requirements in CAFM tables.

SITE

To ensure that the test results are not affected by extraneous factors, the laboratory phase should be done by an independent contractor and at the contractor's facility. The contractor must have both the system configuration required by CAFM and the functional personnel to perform the required testing.

TIME LINE

The laboratory phase is expected to take 2 to 6 weeks.

Prototype Phase

PURPOSE

Once the laboratory phase has been successfully completed, the more extensive prototype phase can begin. The purpose of the prototype phase is to test the CAFM system in an environment that reflects typical day-to-day operations. That environment should encompass a representative cross section of the INS facilities management organization—headquarters, regional office, and field offices (district office, BPSH, SPC, etc.).

More rigorous than the evaluation proposed for the laboratory phase, the prototype evaluation will identify problems (for example, with file size and system activity) that may result from operating the CAFM system in a larger, true-life environment. The prototype phase also will provide the first opportunity to test the CAFM system communications over a wide area network and to ensure system interoperability among organizational levels. Finally, this phase of testing will enable INS to identify and resolve functional problems resulting from changes in business processes necessitated by the requirement to adapt to the new integrated facility management system.

SITES

Table 4-1 shows the organizational level and the addresses and telephone numbers of the INS offices that we believe are the best candidates for participating in the prototype phase. We consider these sites to be the best candidates because they represent a good cross section of facilities management work, they already have

much of the hardware necessary to operate CAFM, and they have personnel who are knowledgeable about facilities management practices at INS.

Table 4-1. Candidate Participants in the Prototype Phase

Level	Candidate
Headquarters	U.S. Immigration and Naturalization Service Headquarters 425 I Street, NW Washington, DC 20536 (202) 514-4316
Regional office	Eastern Operations Regional Office 70 Kimball Avenue South Burlington, VT 05403-6813 (802) 660-5000
Field offices	
District office	Miami District Office 7880 Biscayne Boulevard Miami, FL 33161 (305) 530-7664
	Buffalo District Office 68 Court Street Buffalo, NY 14202 (716) 846-4741
BPSH	Miami Border Patrol Sector Headquarters 7201 Pembroke Road P.O. Box 8909-33033 Pembroke Pines, FL 33023 (305) 963-9807
SPC	Krome Service Processing Center 18201 SW 12th Street P.O. Box 160327 Snapper Creek Station Krome, FL 33175 (305) 552-1845
BPS	Miami Border Patrol Station 7201 Pembroke Road P.O. Box 8909-33033 Pembroke Pines, FL 33023 (305) 963-9807
POE	Champlain Port of Entry Border Inspection Station 65 West Service Road Champlain, NY 12919 (518) 298-3221

TIME LINE

Setting up for the prototype phase will take 1 to 2 months. Setup will include establishing the CAFM database at the regional office selected to test the system. In addition, the communications connections among the test sites must be

established, and each office participating in the test must have the required client software installed on site. Once every site has the software installed and communication with the CAFM server has been verified, full prototype testing will begin and will require about 3 months to complete.

Resource Requirements

SOFTWARE LICENSES

For testing the CAFM system during the laboratory and prototype phases of implementation, INS should acquire licenses for 10 standard CAFM seats, allowing up to 10 users to access the system concurrently.

DATA

A database will be required before the laboratory phase can begin. We recommend that INS's Interim Project Tracking System be used as the initial data source. Work to populate the CAFM with data from FIRM, FRANCS, and TEC should continue throughout the testing phases. By the time the prototype phase is completed, the CAFM database should be fully populated and ready for full deployment and subsequent nightly updates.

STAFFING AND TRAINING

The laboratory phase will be conducted by contractor staff. However, the prototype phase will require the support of INS staff—as many as 15 individuals at headquarters, 5 individuals at the regional office, and 8 individuals at the field offices (3 at the district office, 3 at the BPSH, and 2 at the SPC). These individuals will be responsible for testing the software at their respective locations and the communications connections to the server at the regional office. In addition, INS will need to select a database manager for headquarters and a DBA for the regional office. Those two individuals should have Oracle and Powerbuilder experience and will assist in fine-tuning the software and database administration responsibilities.

Innovative Tech can provide CAFM training for contractor staff responsible for conducting the laboratory phase. That training will take 2 to 3 days.

Innovative Tech also will train INS staff participating in the prototype phase. The database manager at headquarters and the DBA at the regional office will require 5 days of training to learn all aspects of the software and to prepare for a support role as spot trainers for other INS personnel. In addition, Innovative Tech will provide 2 to 3 days of training to three high-end users (one each from the district office, the BPSH, and the SPC) and 1 day of training to standard users.

Documentation

We anticipate that participants in the laboratory and prototype phases will have comments about the CAFM system. Field input should be submitted using one of INS's accepted E-mail packages already in place (cc:Mail, WordPerfect Office, or Vines).

DEPLOYMENT PHASE

Once the testing phases are satisfactorily completed and any remaining problems solved, INS can deploy the CAFM system in all remaining offices involved in facilities management. Before beginning full deployment, however, INS will need to do the following:

- ◆ Purchase additional concurrent standard seats, which will require determining the number of daily users who will need access to the CAFM system at the same time versus the number of occasional users for whom the Infomaker module will be sufficient
- ◆ Purchase seats for the people who will need the CAD Integrator or Cable Management module
- ◆ Acquire additional hardware
- ◆ Select and train two more DBAs
- ◆ Train users.

Innovative Tech can provide CAFM training during full deployment. However, we recommend that INS use a "train the trainer—train the masses" approach. That is, Innovative Tech should train selected INS personnel, then those personnel can go back to their home locations and train the CAFM users there.

Appendix

Abbreviations

AMIS	Asset Management Information System
AMMS	Advanced Maintenance Management System
BPS	Border Patrol station
BPSH	Border Patrol sector headquarters
CAD	computer-aided design
CADD	computer-aided design and drafting
CAFM	computer-aided facilities management
CMS	Creative Management Systems
COTS	commercial off-the-shelf
DBA	database administrator
FIRM	Foundation for Information Real Property Management
FRANCS	Facilities Renovation and New Construction System
GIS	graphical information system
INS	Immigration and Naturalization Service
LAN	local area network
ODBC	open database connectivity
POE	port of entry
PSDI	Project Software and Development, Inc.
R&A	repair and alteration
SPC	service processing center
TEC	The Environmental Company
TMS	Total Maintenance System

REPORT DOCUMENTATION PAGE

Form Approved
OPM No.0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources gathering, and maintaining the data needed, and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503.

1. AGENCY USE ONLY (Leave Blank)		2. REPORT DATE Jul 97	3. REPORT TYPE AND DATES COVERED Final	
4. TITLE AND SUBTITLE Computer-Aided Facility Management at the U.S. Immigration and Naturalization Service			5. FUNDING NUMBERS C DASW01-95-C-0019 PE 0902198D	
6. AUTHOR(S) Karen M. Dahut, Paul D. Jung, Mark A. Fritzlen, Jeffrey S. Frost				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Logistics Management Institute 2000 Corporate Ridge McLean, VA 22102-7805			8. PERFORMING ORGANIZATION REPORT NUMBER LMI- IN602T2	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) Mr. David Yentzer, Assistant Commissioner INSHQADM, Room 2100 425 "I" Street Washington DC 20536			10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES				
12a. DISTRIBUTION/AVAILABILITY STATEMENT A: Approved for public release; distribution unlimited			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) The U.S. Immigration and Naturalization Service is responsible for enforcing the laws regulating the admission of foreign-born persons to the United States, among other things. In support of its mission, the INS owns or leases facilities at more than 400 sites nationwide. The buildings are widely dispersed, may be located in a remote border area or a city, and range widely in size and function. INS's facilities management staff must track the entire inventory of INS buildings, making sure that they are properly operated and maintained, and must plan and oversee each new construction or repair and alteration project. Lease negotiation is another important facilities management function. To manage its facilities requirements, projects, and resources as effectively and efficiently as possible, INS determined that it needs a computer-aided facility management system that combines all facility management functions into a single, comprehensive system usable at all levels of the organization. This report conveys the results of a study to identify CAFM software that best meets INS functional requirements. The study also specifies the hardware and other resources required for an integrated facility management system using the selected CAFM software, and proposes a plan for implementing the new system.				
14. SUBJECT TERMS Immigration and Naturalization Service, computer-aided facility management, CAFM			15. NUMBER OF PAGES 32	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UL	